THE CANADIAN IRON INDUSTRY.

"There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune:
Omitted, all the voyage of their life,
Is bound in shallows and in miseries.
On such a full sea are we now afloat,
And we must take the current when it serves,
Or lose our ventures."

These lines apply with peculiar force to Canada, in the present stage of her Iron Industry.

Events are transpiring from day to day in the neighboring Republic, which demonstrate that the Iron Industry of that great country has now reached such magnificent proportions, under the wise protective policy, so well maintained for the past forty years, that American iron masters are able to compete on equal terms with the world.

History repeats itself. As with England at the middle of this century, so now with the United States. Her Iron Industry has reached that stage when the Government of the country can consider the question of a reduction in its protective tariff, with comparative safety to the Industry itself.

Here in Canada, the Iron Industry, still in the pioneer stage, although under Government encouragement, showing an increase in actual output of over 100% in the past two years, broadening out day by day, making a place for itself in the home market, and in the face of many difficulties displacing gradually the products of American and British furnaces, finds itself, at the most critical stage of its existence, threatened by a premature demand for a reduction in the current protective duties, which, if acceded to by the Government, will surely prevent further progress, if indeed it does not altogether annihilate the Industry, by exposing it before it is yet established to the hostile competition of foreign producers, particularly to the competition of American furnacemen, who have of late been the

chief, if not the only competitors for our most important territory, viz., the markets of Western Canada.

To produce Pig Iron, the basis of all subsequent stages of the Iron Industry, a very heavy initial expenditure has to be made in the prospecting, securing, and developing of mines, woodlands, lime stone quarries, railways, shipping docks, etc., necessary to ensure a constant supply of raw material.

The establishment of the plant itself demands a heavier outlay, in proportion to the value of the product, than is required for the production of any other staple. It is the experience of almost every iron master, that in the early period of iron making in all countries, the work is more or less of an experimental nature, and as it must be carried on upon a large scale, and if unsuccessful the investment becomes worthless, the risk of ruin to the first adventurers is great.

It has necessarily resulted from these causes, that to start an Iron Industry on an important scale, in any country, however favorable its apparent natural conditions, state aid, either by a direct bounty, by a heavy protective duty, or by both combined, has been found necessary, and it is those countries where this has been *effectually done*, which are to-day the large producers of iron, not only supplying their own wants, but also those of other countries.

To deal with this question intelligently, it is well for Canadians to review, as briefly as the importance of the issues will permit, the history of the establishment and successful development of the Iron Industry in other countries, and particularly note the broad liberal policy of protection under which Great Britain and the United States alike built up the greatest and most successful iron industries of modern times.

The national importance of the question will perhaps in some measure excuse a lengthy reference to the splendid equipment in furnace plant, shipping docks, and other accessories necessary to economical working, now possessed by our powerful competitors in the neighboring Republic.

John Stuart Mill says: "To draw inferences is the great business of life." In the light of what has been accomplished by wise administration in other countries, particularly in Great Britain and the United States. Canada may be guided as to

the bestand surest course for the early development of the great mineral wealth with which God has blessed her.

Iron is perhaps the Almighty's greatest metallurgical gift to man. Its use can be traced to the very earliest ages. Biblical and secular history abound with mention of the use of iron by the forerunners of our race. Tubal-cain, born in the seventh generation from Adam, is described in the 4th Chapter of Genesis as "an instructor of every artificer in brass and iron."

In the time of Moses, the Egyptians seem to have been engaged in the manufacture of iron, as referred to in the 4th chapter of Deuteronomy, 20th verse: "But the Lord hath taken you and brought you forth out of the iron furnace, even out of Egypt." This expression again occurs in I. Kings, viii. and 51.

Swank, in his admirable "Iron in all ages," says: "The Egyptians, whose existence as a nation probably dates from the second generation after Noah, and whose civilization is the most ancient of which we have any knowledge, were at an early period familiar with the use and manufacture of iron. Iron tools are mentioned by Herodotus as having been used in the construction of the pyramids. In the sepulchres of Thebes and Memphis, cities of such great antiquity that their origin is lost, butchers are represented as using tools which antiquarians decided have been made of iron and steel. Iron sickles are also pictured in the tombs of Memphis and Thebes, and various articles of iron have been found, which are preserved by the New York Historical Society, and are probably three thousand years old.

Herodotus in the 5th Century before Christ speaks of the Chalybians as "a people of iron workers."

The Persians and their northern neighbors, the Medes, made iron and steel long before the Christian era, and so did the Parthians and other Scythian tribes.

Ages ago Damascus, the capital of Syria, manufactured its famous swords from Indian and Persian steel.

It may be assumed as susceptible of abundant proof that the knowledge of iron, if not of its manufacture, was common to the people of Africa long previous to the Christian era. The

decay of the Iron Industry of these ancient countries probably contributed towards the ruin of the Empires of the East, and as Swank says: "With the fading away of Asiatic and African civilization and magnificence the manufacture and use of iron in Asia and Africa ceased to advance."

Following the march of civilization the Iron Industry took root in the West, and has contributed in a very great measure to the wealth of the two most powerful industrial nations of modern times, Great Britain and the United States.

GREAT BRITAIN.

The history of the British Iron Industry dates back to the days of the Roman occupation, as evidenced by the fact that in Kent, Sussex, Gloucester, Yorkshire, and many other parts of England large quantities of iron cinder, as old as the Roman era, have been discovered. This has been further proved by the finding of Roman coins, pottery and altars in connection with the cinder.

From the days of the Romans down to the middle of the 17th Century, the furnaces and forges of England were operated altogether with charcoal as a fuel. Aided by the protection to native iron inaugurated by Edward III, during his reign from 1327 to 1377, the Iron Industry made very good progress. In the 14th century the ironsmiths of England had brought the trade to a fine art, aiding thereby to establish the present industrial pre-eminence of England; locks, keys, hinges, and bolts produced during that period having never since been equalled in beauty of design.

In 1615 it is said that there were 800 furnaces, forges, or other mills making iron with charcoal, of which Dudley a few years later estimated that about 300 were furnaces, the weekly product of which was about 15 tons each.

The charcoal Iron Industry seems to have reached its height towards the close of the reign of Elizabeth, when the trade became so prosperous that instead of importing iron as she had hitherto done, England began to export it in considerable quantities, in the shape of iron ordnance. The extent of the

operations, however, began to exhaust the forests of England about the beginning of the 17th century, and the British Parliament had to give its serious attention to the question.

In 1740, the production of pig iron in Great Britain was only 17,350 tons, her Iron Industry at this time having been almost destroyed by the decreasing supply of charcoal.

About 1750 mineral coal, in its natural state or in the form of coke, came into notice as a substitute for charcoal. The iron trade of England and Wales at once revived, while that of Scotland may be said to have been actually created by this new fuel.

Great improvements were introduced in the furnace plants of Great Britain, and the Industry from that date forward advanced steadily.

In 1787 the British Government adopted a strong Protective Tariff for their Iron Industries, the duty on pig iron being placed in that year at 67½ per ton, with higher rates for manufactured iron. This duty on pig iron was later on increased in 1819, and again in 1825, and the Protective Tariff in this department was maintained down to the year 1845.

The effect of the introduction of mineral coal, and of the protective duties levied on foreign iron was most beneficial. The Industry at once showed strength, and from that date continued to grow rapidly, until in 1796 there were 104 furnaces in England and Wales producing 108,793 tons of iron, and in Scotland 17 furnaces producing 16,086 tons.

In 1820, the total production had reached 400,000 tons; in 1825, 581,367 tons; in 1840, 1,396,400 tons; and in 1854, 3,069,838 tons, this quantity being then estimated as fully one-half of the world's production of pig iron.

In 1889, Great Britain's production of pig iron had reached 9,321,563 tons of 2000 lbs. This, with a population estimated at 38,000,000, giving the enormous production of 495 lbs. per head. Of this output Great Britain herself consumes 250 lbs. per capita.

In considering the progress made it is well to remember the various Acts of Parliament enforced from time to time by England to protect her national Iron Industry, by preventing the emigration of her skilled artisans to other countries, by guard-

ing against the sale of her inventions to competitors, and by the imposition of Customs duties upon foreign products.

For instance, while the growing scarcity of wood for the supply of charcoal convinced the Government and people of England, as early as 1750, (before mineral fuel had come into use,) that it would be to their advantage to allow the free admission of iron in its rudest form from the American Colonies, and that as a matter of fact they passed an Act, in that year, setting forth that it would be of great advantage not only to the colonies, but also to the kingdom, that the manufacturers of England should be supplied with pig and bar iron from the colonies free of duty, yet they so fully believed in protecting their own home industries, that the same Act that made the rudest forms of iron free of duty (because England was unable to produce the material herself), contained the following clause :

"That pig and bar iron made in His Majesty's colonies in America *may be further manufactured in this kingdom*, be it further enacted . . . . that from and after the twenty-fourth day of June, one thousand seven hundred and fifty, no mill or other engine for slitting or rolling of iron, or any plateing forge to work with a tilt hammer, or any furnace for making steel, shall be erected, or after such erection continued in any of His Majesty's colonies in America, and if any person or persons shall erect, or cause to be erected, or after such erection continue, or cause to be continued, in any of the said colonies, any such mill, engine, forge or furnace, every person or persons so offending shall for every such mill, engine, forge, or furnace, forfeit the sum of two hundred pounds of lawful money of Great Britain, and it is hereby further enacted . . . . that every such mill, engine, forge, or furnace, so erected, or continued contrary to the directions of this Act *shall be deemed a common nuisance, etc., etc.*"

By the Act in question Great Britain undoubtedly encouraged the production of pig and bar iron in America, by exempting them from duties to which like commodities were subject when imported from any other country, but she did this simply because she had not until that date found a fuel substitute for charcoal. A glance at the Act will moreover show that she imposed an absolute prohibition upon the erection of steel furnaces and slit mills in any of her American colonies.

Various other restrictive Acts of Parliament were passed in

1781, 1782, 1785 and 1795 to prevent the exportation to foreign countries of machinery and tools used in the manufacture of iron and steel, and to prevent skilled mechanics from leaving England.

For example, an Act in 1785, 25 Geo. III, c. 67: "To prevent, under severe penalties, the enticing of artificers or workmen in the iron and steel manufactures out of the kingdom, and the exportation of any tools used in these branches to any place beyond the seas."

The penalty provided in this Act read:

"If any person or persons shall contract with, entice, persuade, or endeavor to seduce, or encourage, any artificer or workman concerned or employed, or who shall have worked at, or been employed in the iron or steel manufactures in this kingdom, or in making or preparing any tools or utensils for such manufactory, to go out of Great Britain to any parts beyond the seas (except to Ireland), and shall be convicted thereof . . . . shall for every artificer so contracted with, enticed, persuaded, encouraged or seduced, or attempted so to be, forfeit and pay the sum of five hundred pounds of lawful money of Great Britain, and shall be committed to the common gaol . . . . there to remain without bail or mainprize for the space of twelve calendar months, and until such forfeiture shall be paid, and in case of a subsequent offence of the same kind, the person or persons so again offending shall upon a like conviction, forfeit and pay for every person so contracted with, enticed, persuaded, encouraged, or seduced, or attempted so to be, the sum of one thousand pounds . . . . and shall be committed to the common gaol, as aforesaid, there to remain without bail or mainprize for and during the term of two years, and until such forfeiture shall be paid."

In addition to these restrictive measures, a glance at the protection afforded to the British manufacturers of iron from 1782 to the close of 1825, will demonstrate to Canadians the fact that England owes her greatness in the Iron Industry very largely indeed to the protection granted to her native industries in the early years of the trade.

Quoting from Scrivenor's History of the Iron Trade:

"From 1782 to 1795 the duty on foreign bars was £2 16 2 per ton. It rose to £3 4 7 in 1797. From 1798 to 1802 it was £3 15 5. In two years it had got to £4 17 1, and from 1806 to 1808 it stood at £5 7 5¾d. In the three years between 1809

and 1812 it was £5 9 10, and in the five years ending with 1818 it had been £6 9 10.

"At this date a distinction was made in the interests of British shipping, for whilst thenceforward till the close of 1825, the duty on foreign bars was £6 10 if imported in British ships, it was £7 18 6 if imported in foreign. Nor was this all: iron slit, or hammered into rods, or iron drawn down, or hammered, less than three-quarters of an inch square, was made to pay a duty at the rate of £20 per ton; wrought iron, not otherwise enumerated, was taxed with a payment of £50 for every £100 worth imported; and steel, or manufactures of steel, were similarly loaded with a fifty per cent. duty."

Mr. James Mavor, the present Professor of Political Science in the University of Toronto, quoting from Conrad's Handworterbuch der Staats Wissenchafter, Vol. III, page 45, and also from various other authorities, gives the following data in regard to the duties imposed at various times by Great Britain, in the interest of her Iron Industry.

"The duty imposed on pig iron in 1787 was 67/2 per ton. Duty increased 1819 to 130/- per ton on pig iron. Duty raised 1825 by 10/- per ton. Duty altered 1842, 25% ad valorum on pig iron. Duty abolished 1845.

"Duty on manufactured iron altered 1845, 15% on manufactured iron and steel, this subsequently reduced to 10%. Duty on iron wholly abolished 1860."

Among other measures quoted by this authority are special rates for carrying coals to iron works, embodied in the earlier railway acts.

The period of protection by high Customs duties extended from 1787 until 1860, giving to the Iron Industry protection of a permanent character for upwards of 73 years.

The restrictive measures cited, although they were in many cases harsh, undoubtedly resulted in building up an industry of great value not only to Great Britain, but to the world at large.

UNITED STATES.

Great as has been the progress made in the Iron Industries of Great Britain, still more marvelous has been that of the United States, especially when we consider that the development of the American Iron Industry has been made very largely within the past thirty years, and a full consideration

of the facts will show that this rapid growth has been due almost altogether to the fact that during that thirty years, the Government of the United States has stood firmly by the policy of protection to the native Industry, and that the greatest progress was undoubtedly made when the protection was at its highest point

The first attempt to establish iron works in the United States was made in 1619, the works being located at Falling Creek, a tributary from the James River, in Virginia. This was unsuccessful, but during the 18th century Virginia became quite prominent in the manufacture of Iron.

In 1643 an Iron Works was started in the Province of Massachusetts Bay, which claims to be the first successful iron works established in America. Several other forges were erected at various points throughout New England, in all cases the fuel used being charcoal.

In the State of New York the first iron works would seem to have been erected in 1740 on Ancrum Creek, Columbia County, close to the Hudson River. This furnace was contemporary with our own St. Maurice forge erected A. D. 1752.

In 1800 the celebrated Champlain iron district was developed, and in 1801 the first iron works in the district were built. As in New England, so in New York and throughout the United States charcoal was the only fuel used at this period.

New Jersey saw her first iron furnace in 1676, and Pennsylvania, the greatest producer of all the States, saw the inauguration of the Industry under the able administration of Wm. Penn in 1716, the iron produced by one Thomas Rutter Smith, who lived not far from German Town, being said to have proved equal to the best Swedes iron.

In 1728 there were four furnaces in blast in Pennsylvania, and from that date forward the Iron Industry of the State was assured.

Space prevents a more minute description of the difficulties experienced and overcome by the pioneer furnacemen of the United States.

Coming down to more modern days, the following statistics, dating from 1854 to 1890 will serve to show the magnificent development of the American Iron Industry, under the Protective Tariff shown in the list

PRODUCTION OF PIG IRON IN THE UNITED STATES FROM 1854 TO 1890.

Net tons of 2,000 pounds.

Calendar Years.	Anthracite and mixed anthracite and coke.	Charcoal.	Coke and raw bituminous.	Total.	Duty on Pig Iron of all kinds.
1854	339,435	342,298	54,485	736,218	30 per cent.
1855	381,866	339,922	62,390	784,178	30 " "
1856	443,113	370,470	69,554	883,137	30 " "
1857	390,385	330,321	77,451	798,157	30 " "
1858	361,430	285,313	58,531	705,094	24 " "
1859	471,745	284,041	84,841	840,627	24 " "
1860	519,211	278,331	122,228	919,770	24 " "
1861	409,229	195,278	127,037	731,544	24 " "
1862	470,315	186,660	130,687	787,662	$6.00 per ton.
1863	577,638	212,005	157,961	947,604	6.00 " "
1864	684,018	241,853	210,125	1,135,996	6.00 " "
1865	479,558	262,342	189,682	931,582	9.00 " "
1866	749,367	332,580	268,396	1,350,343	9.00 " "
1867	798,638	344,341	318,647	1,461,626	9.00 " "
1868	893,000	370,000	340,000	1,603,000	9.00 " "
1869	971,150	392,150	553,341	1,916,641	9.00 " "
1870	930,000	365,000	570,000	1,865,000	9 00 " "
1871	956,608	385,000	570,000	1,911,608	7.00 " "
1872	1,369,812	500,587	984,159	2,854,558	7.00 " "
1873	1,312,754	577,620	977,904	2,868,278	6.30 " "
1874	1,202,144	576,557	910,712	2,689,413	6.30 " "
1875	908,046	410,990	947,545	2,266,581	7.00 " "
1876	794,578	308,649	990,009	2,093,236	7.00 " "
1877	934,797	317,843	1,061,945	2,314,585	7.00 " "
1878	1,092,870	293,399	1,191,092	2,577,361	7.00 " "
1879	1,273,024	358,873	1,438,978	3,070,875	7.00 " "
1880	1,807,651	537,558	1,950,205	4,295,414	7.00 " "
1881	1,734,462	638,838	2,268,264	4,641,564	7.00 " "
1882	2,042,138	697,906	2,438,078	5,178,122	7.00 " "
1883	1,885,596	571,726	2,689,650	5,146,972	7.00 " "
1884	1,586,453	458,418	2,544,742	4,589,613	6.27 " "
1885	1,454,390	399,844	2,675,635	4,529,869	6.72 " "
1886	2,099,597	459,557	3,806,174	6,365,328	6.72 " "
1887	2,338,389	578,183	4,270,635	7,187,206	6.72 " "
1888	1,925,729	598,789	4,743,989	7,268,507	6.72 " "
1889	1,920,354	644,300	5,951,425	8,516,079	6.72 " "
1890	2,448,781	703,522	7,154,725	10,307,028	6.72 " "

In an able article, "From Mine to Furnace," Mr. John Birkinbine, Past President, Am. 1st. M. E. recently said: "The following remarks concerning the progress of the Pig Iron Industry, and a prophecy as to its future, appeared in Vol. XV of the tenth census, that of 1880, which is presented here to show how much more rapidly the Industry has developed than was then anticipated would be the case eight years ago, when it was written.

"'In 1866 the United States had reached the production of Great Britain in 1835, that is to say, she was then 31 years behind the latter country. In 1884 she was about 21 years behind England, and at the same rate of increase for both countries the United States will be about 15 years behind England in the year 1900, and will reach and pass her in 1950. The production of Pig Iron of each country for that year, as determined from the equation of their respective curves, being a little over thirty million tons.'

"The facts are that in 1890 the United States passed, and has since that time led Great Britain as a producer of Pig Iron."

In a paper read at a meeting of the American Institute of Mining Engineers, in October 1890, by its then President, Hon. Abram S. Hewitt, he showed a comparative rate of increase in population and pig iron production in the United States for six decades, and brought out the striking conclusion that the production of pig iron has always increased more rapidly than the population, and that the ratio is an increasing one.

Between 1830 and 1860 the production of iron increased twice as fast as the population. Between 1860 and 1890 it increased four times as rapidly, in reality over four times, thus proving that the national wealth continues to grow from decade to decade, at a rate of acceleration of which the world affords no previous example.

Inasmuch as during all this time the United States have imported iron in addition to their native production, it follows that the consumption per capita has also increased more rapidly than the population.

In 1855, according to careful calculations made by Mr. Birkinbine, the United States was consuming iron at the rate of 117 lbs. per head, whereas in 1890 the consumption had increased to rather more than 300 lbs. per head. the whole of which, for the

first time in the history of the country, was being produced within American borders.

Mr. Birkinbine, in speaking of the present and future of the Iron Industry, deplores the fact that part of the development has been brought about by real estate speculations, which he rightly conjectures will exert a restricting influence in the near future. He is however of the opinion that,

"If political action does not disturb the industry, or if labor troubles do not seriously interfere with the development, there seems to be no reason for expecting that the Pig Iron Industry will remain dormant, but we may rather look for a nearly steady growth, which at the expiration of 25 years will probably make the annual requirements of the United States in pig iron, or its equivalent, amount to between twenty and twenty-five million gross tons."

These figures Mr. Birkinbine states are the result of a careful study of statistics, taken in connection with an intimate knowledge of the present state of development, and a personal acquaintance with the possibilities of various portions of the country. He says,

"There will be times of depression like the present, preceded and followed by others of unusual activity, but we may confidently look forward to a material advance, perhaps greater than estimated, but certainly much more pronounced than was believed possible ten years ago."

IRON ORE.

The following figures taken from the "Report of Mineral Industries in the United States" at the 11th census, 1890, will give some idea of the magnitude of the Iron Industry of the United States.

In 1889 the production of iron ore in the United States including Red Hematite, Magnetite, Brown Hematite and Carbonate, amounted to 14,518,041 gross tons, of a total value of $33,351,978.

The total capital invested in the ore mines in the same year is given as $109,766,199. This is all expended within the country on the native ores.

In addition to this iron ore was imported in the same year from foreign countries to the extent of 853,573 tons, valued at $1,852,392.

With reference to foreign ore imported into the United States, Mr. Birkinbine in his "Production of Iron Ore," 1892, says,

"While the United States has large deposits of iron ore of all kinds, widely distributed throughout the various States and Territories, still the low rates of wages in foreign countries, and cheap water transportation rates, have admitted considerable quantities of iron ore into this country, in spite of a specific duty of 75cts. per ton, which is collected on all iron ore imported. In the year ending December 31st, 1892, iron ore to the amount of 806,585 long tons, valued at $1,795,644 or $2.23 per ton, was thus imported. All of this iron, however, is consumed near the ports of entry, and much of the ore entering the port of Baltimore is unloaded direct from the vessels to the stock piles. This is also the case with one Pennsylvania furnace.

All the iron ore imported from Cuba is taken from the mines operated by American companies. Until 1892, but one company was mining and shipping ore from Cuba, but last year a second enterprise was represented by actual shipments, and 1893 is expected to add at least one more active corporation to the list of Cuban mines.

It is significant, in looking over the list of imports for 1889, to find that whereas Cuba supplied 243,255 tons, of a value of $535,524, the Provinces of Quebec, Ontario, Manitoba and the North West Territories combined, supplied (be it remembered under equal conditions as to the tariff) only 4,091 tons, of a total value of $10,697.

Again in 1892, statistics show that whereas Cuba supplied 307,115 tons, valued at $618,222. Quebec, Ontario, Manitoba and the North West Territories supplied only 8,606 tons, British Columbia 2,749, a total export for all Canada of 11,355 tons, valued at $27,340.

Spain was the largest supplier of ore in 1889, sending 298,568 tons, of a value of $621,481.

These statistics prove that up to the present time Canadians have found it impossible to compete successfully against the negro labor of Cuba, and the cheap labor of Spain in supplying iron ore to the American market. The question Canadians have to ask is whether under uniform free trade Canada can hope to improve her position as against her Cuban and Spanish competitors. This seems highly improbable. All the facts

point to one conclusion, viz., that Canadians must turn their attention to smelting their own ore for the home market.

EQUIPMENT AND SHIPPING FACILITIES.

The equipment of the American mines and furnaces surpasses in excellence that of any of the European nations, and the facilities they possess for cheap transportation of ore from mine to furnace is unrivalled. The shipping docks at Marquette, L'Anse, and St. Ignace, Mich., are worthy of special notice.

These docks have been constructed at a heavy cost by the railways which penetrate the interior, for the special purpose of facilitating the handling of Lake Superior ores at the minimum of cost, and they furnish a very striking example of the foresight and enterprise of American railroad men, who perhaps more than any other class, realize the national importance of the Iron Industry.

These terminal facilities consist of shipping docks, with elevated railroad tracks from 35 to 47.5 feet above water level. By means of drop bottoms the ore is dumped from the cars into pockets, thence to be discharged at will by means of iron chutes let down into the vessel's hold. By this system the ore is rarely, if ever, handled, from the time it leaves the mine until it reaches lower lake ports.

The total investment for docks, specially equipped for handling and shipping iron ore is placed, by so good an authority as Mr. Birkinbine, at approximately $4,000,000 in the year 1889.

RECEIVING DOCKS.

Of equal importance is the system of receiving docks, specially erected for the purpose of handling ore to blast furnaces, or at points from which railroads radiate to blast furnaces.

These docks are of various types, generally furnished with swing boom derricks operated by steam power. By means of these derricks iron buckets are lowered into the holds of the vessels. After being filled with ore by the navvies the buckets are raised again, and swung to the point where the ore is to be deposited, or if for distant points, into hoppers, thence to be discharged into cars. The buckets dump automatically at the

point desired, and return to the hold without detaching from the machinery.

It is estimated that the capital invested for receiving docks fully equals that mentioned for shipping docks, and that one such receiving dock alone costs, equipped, fully $800,000.

The investment, although large, is well spent, for by means of these facilities it has been found possible to handle quantities of ore, which could not have been moved in any other way, while the cost of handling has been reduced to a minimum.

Mr. Birkinbine gives the following data as to the cost of handling ore by the new system of receiving docks.

"The expense of shovelling ore into buckets in the holds of vessels, varies from 10 to 15 cts. per long ton, the rate being controlled by stevedores, while with the improved apparatus at some of the docks, this ore in buckets is lifted from the vessel, carried back 350 feet, and dumped, at a total cost, including labor, wear and tear, interest, fuel accounts reported, of from 1 to 1.5 cts. per ton.

"With 21 men in the hold of a vessel carrying 2,000 long tons of iron ore, the entire cargo has been stocked in 17 hours. Other instances are mentioned where with 28 men 2,200 long tons were similarly handled in 15 hours, and 2,100 long tons were handled by 18 men in 17 hours.

"In using these improved apparatuses in loading from stock piles to railroad cars, it is not uncommon to have a gang of men shovelling into buckets, and loading the ore on cars at the rate of 8 or 9 tons per man per hour."

In addition to these unrivalled facilities for economical handling of raw material, the American furnaceman works under most advantageous circumstances with regard to the large output of his furnace.

As an example, one of the furnaces in connection with the Edgar Thompson Steel Works, of Pennsylvania, recently produced the remarkable output for a single day of 623 tons of iron. In a week one furnace stack in connection with this company produced 3,203 gross tons, and in a month one stack produced 12,800 gross tons. That is, in one month, one of these furnaces produced fully as much as twenty-five years ago would have been turned out in a year, from the best and largest of the American blast furnaces

With such splendid facilities for economical working, with ample capital, and many other benefits accruing from a long continued policy of protection, the American Iron Industry stands to-day in a perfectly safe position, the trade (aside from the ordinary periods of depression common to all industries) bound to increase in volume, the whole future of the industry linked with the life of the nation.

CONTINENTAL STATES.

Following the example of Great Britain and the United States, France, Belgium, Germany, and other Continental States established, and still maintain, high protective duties with most beneficial results in many branches of the Iron Industry.

Germany's case is especially worthy of mention.

On the 14th May, 1882, Bismarck, in a speech before the German Reichstag, said,

"The success of the United States in material development is the most illustrious of modern time. The American nation has not only successfully borne and suppressed the most gigantic and expensive war in all history, but immediately afterwards disbanded its army, found employment for all its soldiers and marines, paid off most of its debt, gave labor to all the unemployed of Europe, as fast as they could arrive within its territories, and still by a system of taxation so indirect as not to be perceived, much less felt. *Because it is my deliberate judgment that the prosperity of America is mostly due to its system of protective laws, I urge that Germany has now reached that point where it is necessary to imitate the tariff system of the United States.*"

Bismarck gave to Germany a protective policy with something of a permanent character, and the result has been the building up of a great national industry in that country.

In 1834 Germany and Luxemburg, included in the Zollverein, produced only 110,000 metric tons (2,204 lbs.) of pig iron. In 1881 Germany and the Grand Duchy of Luxemburg produced 2,914,009 metric tons (2,204 lbs.). In 1890 the production had increased to 4,637,239 metric tons. This increase in pig iron has been accompanied by an enormous increase in the output of coal and lignite.

As an illustration showing Germany's progress in the manufacture of basic steel, in 1890 England produced 503,400 tons of basic steel, Germany, Luxemburg and Austria produced 1,695,472 tons.

CANADA.

Canada's "Natural fitness" for the successful establishment of the Iron Industry is beyond question.

The earnest work performed by the Geological Survey of Canada, and by private prospectors, has well established the fact that throughout a very large part of her vast territory (three and a half millions of square miles in extent) she is rich in iron ores of almost every variety known to metallurgy.

Commencing at the Atlantic seaboard, Canada can claim in

CAPE BRETON

Extensive deposits of Brown Hematite, Magnetite and Spathic ores, lying side by side with coal fields of great magnitude.

NOVA SCOTIA.

The Limonite, Specular and Spathic Clay iron-stone and Hematite of Pictou county, Specular ore in Guysboro county. At Londonderry an immense vein of anchorite holding Brown Hematite.

Between Truro and Windsor numerous deposits of Brown Hematite often highly manganeferous.

A range of Ferro-ferous strata extending from Digby to Windsor, embracing Red Hematite and Magnetite of Nictaux and Clementsport.

Throughout the whole of this district mineral fuel and fluxes occur in close proximity to the iron mines, affording exceptional facilities for economic furnace practice.

NEW BRUNSWICK.

Magnetic and Bog Ores, with coal fields at Grand Lake and elsewhere, and a plentiful supply of hard wood for charcoal purposes.

QUEBEC.

The Bog and Lake Ores of this province are probably the most extensive deposits of a like nature in the world. The ore bearing area extends from the borders of Ontario in the West, to Gaspé in the East, and on the other hand from the Eastern Townships to the Laurentian Range of mountains, embracing the historical Three Rivers ore district.

Good deposits of Magnetic Ores are found throughout the Province, especially in the vicinity of Sherbrooke, Leeds, Sutton, St. Jerome, and in Pontiac County.

An inexhaustible growth of hard wood, suitable for the manufacture of charcoal is everywhere found in close proximity to the iron deposits. Limestone for flux is most abundant throughout the Province.

ONTARIO.

Vast deposits of Ore exists throughout Ontario from the Ottawa Valley to the head of Lake Superior.

The ore is of many varieties, Magnetic, Red Hematite, Limonite, Specular, and occasionally Bog ores, all more or less rich in metallic iron.

At the recent World's Fair in Chicago, Ontario exhibited no less than 120 samples of iron ore taken from her various mines, all these samples averaging 60% and over in metallic iron, and many of them exceptionally free from impurities. Most notable among the localities sending exhibits were the Ottawa Valley, including Lanark, and the Kingston and Pembroke Districts, Madoc and other points in the County of Hastings, Haliburton, Coehill, and other locations in the County of Peterboro, East Algoma, Thunder Bay District, including Atak-Okan Range.

In the matter of fuel, Ontario, like her sister Province Quebec, possesses most extensive forests of hard wood, admirably suited for the production of charcoal.

She is also rich in fluxes.

MANITOBA.

Deposits of Magnetic and Bog ores on Lake Winnipeg, with an abundant growth of hard wood suitable for charcoal in the vicinity of the mines.

BRITISH COLUMBIA.

While the work of exploration has necessarily been limited, yet the Magnetic ore deposits at Texada Island, and Cherry Creek Bluff are already fairly well proved by actual work. The ore from these mines has found a market at Tacoma, Wash., U. S.

British Columbia is very rich in both coal and wood, the outputs of her collieries at Nanaimo, Wellington and Comox showing a steady increase in tonnage.

Raw Material.

While in the actual work of proving and developing her mines Canada has up to the present accomplished comparatively little; yet the careful preliminary explorations already referred to make it most evident that in raw materials Nature has unquestionably endowed Canada with everything necessary to success.

Market.

Satisfied as to the possession of raw materials, the next most important question for Canadians is a market for the finished product. All facts and figures go to prove that for many years to come Canada's natural market for iron products lies within her own borders, side by side with her mines and forests.

According to the best authorities, Canada uses to-day upwards of 250 lbs. of the products of iron per capita. This on a population of say five millions means, roughly speaking, an annual consumption of 600,000 net tons. In his report of the "Bureau of Mines of Ontario" for 1892, Mr. Arch. Blue estimates the consumption to equal (after making all due allowance for waste in converting pig iron into finished iron and steel) say, 604,252 tons for 1891-92. To better realize the accuracy of these figures, it must be remembered, for instance, that Canada possesses to-day not less than 15,000 miles of railway, standing high among the nations in this particular regard. When her 15,000 miles of railway line is laid with standard 72 lbs. rails (the rail of the future) she will have at 113 tons per mile, in round figures, 1,500,000 tons of steel rails. The average life of a rail is 15 years, therefore renewals are

being made continually, and as a matter of fact the Dominion is using in this department alone, 100,000 tons of the product of iron annually.

During the past year one of our great Trans-Continental Lines alone imported 36,000 tons of steel rails.

The Canadian Railway Companies, if they follow the example of their American rivals, will heartily support the production of steel rails from Canadian ore by Canadian labor. The revenue to be obtained from the carriage of raw materials to the furnace, and of the finished product to the market, as well as through an increased passenger traffic, will more than compensate for the extra price they will be called upon to pay for rail equipment during the first few years of the industry.

All the rails used in Canada to-day are of foreign make.

As a further illustration, the Rolling Mills at Montreal, Hamilton, Swansea, New Glasgow, N.S., and elsewhere, are producing annually, at a fair estimate, 80,000 tons of the products of iron. Unfortunately the raw material for this great output is very largely foreign, although there is no good reason why within the next few years every ton of this should not be supplied by Canadian labor from Canadian ore.

Our iron founders use annually about 80,000 tons of pig iron in castings such as stoves, agricultural implements, and machinery of all classes, one-half only of the material used in this class of work being the production of Canadian furnaces.

Aside from these leading lines the country consumes each year a large quantity of such products of iron as band and hoop iron, special quality bar iron, steel boiler plates, steel sheets, sheet iron, chain cables, slabs, blooms, bridge and structural iron, railway fish plates, rolled beams, nail and spike rods, wire, locomotive tires, iron and steel for ships, steel ingots, bars, and other forms of iron too numerous to mention, but almost wholly the product of foreign labor.

In railways and shipping, Canada pretty well holds her own, proportionately to population, with either Great Britain or the United States.

Possessed of the necessary raw materials, and reasonably protecting her own home market, there is no reason why she should not in proportion to her population hold an equally prominent position in her Iron Industries.

The history of the Canadian Iron Industry dates back to the establishment of the St. Maurice Forges by the French Government about the year 1737. This was followed at various periods by the erection of iron works at Batiscan, L'Islet, Hull, Baie St. Paul and Mosiac, in the Province of Quebec.

Furnace Falls, Normondale, Marmora, Madoc and Houghton, in the Province of Ontario.

Woodstock, in New Brunswick.

Moose River, Nictaux and Bloomfield, in Nova Scotia.

In course of time each and every one of these enterprises had to succumb to the competition of foreign iron, then admittedfree of duty into Canada.

In addition to the difficulty of competing with the more advanced industries of other countries, Canadian pioneer furnacemen labored under many grave disadvantages. The records in every instance speak of small outputs, lack of capital, lack of shipping facilities, mismanagement—good and sufficient reasons in any country, or in any branch of industry, for ultimate failure.

In not a single case has it been shown that lack of raw materials necessitated the closing down of a Canadian furnace. It is true that an almost absolute want of proper shipping facilities in these earlier days made it troublesome and costly to procure raw materials and deliver them at the furnace, but this difficulty has long since been removed by the easy shipping facilities afforded through the net work of railways now in operation all over the country, not to speak of the perfect waterways and splendid system of canals now possessed by the Dominion.

Passing over the pioneer stage, we come to perhaps the most important epoch in the history of the Iron Industry in Canada, viz., the introduction of the Protective Tariff on iron, which came into force in 1887. The tariff as then framed and still in force, was based upon the American tariff of import duties on iron and steel and their products, in the proportion of about two-thirds of the said American tariff, and unquestionably the Dominion Government designed the tariff with a view to protecting *native Canadian labor* against the cheaper labor of Europe, and the better equipment of the United States. It was evidently the intention of the Government in doing this to

afford at least approximately an equal ratio of protection to labor in whatever branch of the Industry it was employed, as this is the system upon which the American tariff is undoubtedly based, and the only system possible of complete success.

Unfortunately the Dominion Government made one mistake, viz., the admission of wrought scrap iron, as the raw material for the manufacture of bar iron, at a less rate of duty than puddled bars, blooms and billets, with which it came into competition. This exception is, as Sir Charles Tupper once said, "the one blot" on the tariff, for it has ever since deprived Canadian furnacemen of a home market for their forge iron, a class of iron which in the order of things they must necessarily produce from time to time, and which should be used by the Canadian Rolling Mill men as their raw material for bar iron, either in the shape of puddled bars, or soft steel billets as the trade may demand.

The admission of scrap iron at a low rate of duty has resulted in two evils. First, it has retarded the progress of the manufacture of pig iron from Canadian ores, inasmuch as the iron masters cannot afford to produce puddled bars or steel billets at competitive prices with cheap wrought scrap. Secondly, it has caused the Canadian Rolling Mill proprietors to make investments in special plant for the manipulation of scrap, and brought about a condition of affairs in the Rolling Mill business that will be greatly disturbed by any sudden change in the tariff with regard to the admission of wrought scrap.

It is the plain duty of the Government to rectify the mistake it has made, but to do so with due regard to the vested interests of all sections of the Industry.

This may be done in several ways, for instance, by naming a definite date, say within from three to five years, when wrought scrap, the present raw material for Canadian bar iron, shall be placed at the same rate of duty as puddled bars or steel billets with which it comes into competition, and that in the meantime a sufficient bounty be granted, either to the rolling mill companies on such iron and steel as they may produce from the products of Canadian blast furnaces, or to the blast furnace companies direct, as an inducement to them to produce steel billets and puddled bars, so that they may shortly be in a position to supply the mills (at a reasonable living profit

to themselves) with all the raw material necessary for the manufacture of bars and other finished iron.

It is not improbable but that a comprehensive arrangement on some such lines would result in the rolling mill companies considering the question of going into blast furnace work on their own account, with most beneficial results to the whole Dominion, or they may adopt the course of erecting plant for the manufacture of steel billets and puddled bars from Canadian pig iron.

In the face of many difficulties the pig iron industry has continued to make creditable progress since 1887, and especially has this been the case within the past two years.

At the close of the calendar year 1891, the total production of pig iron in Canada was only 23,891 tons. Within 18 months, that is to say, at the close of the fiscal year 1892, the output had increased to about 51,000 tons for twelve months, a gain of upwards of 110%. Sixty thousand tons will be a fair estimate of the output to the close of the present fiscal year.

The following will show the furnaces now in blast, with capacity and output :—

LONDONDERRY IRON CO., LONDONDERRY, N. S.

Description of Plant, with Capacity.

Thirty-six thousand acres free hold land,
Ore Mines, yield from 50,000 to 70,000 gross tons.
Limestone Mines, yield from 12,000 to 15,000 gross tons.
Railways—about 12 miles, Company's own property.
Two Blast Furnaces—Capacity about 40,000 gross tons.
One Rolling Mill—Silent, capacity about 8,000 gross tons.
One Pipe Foundry—Silent, capacity about 5,000 gross tons.
Number of men employed—about 350.
Maximum number which has been employed when running all departments full, 807.
Make of Pig Iron—1892—28,052 net tons.
Ore charged (partly bought)—64,430 net tons.
Coke charged—41,006 net tons.
Coal charged (all bought)—1,740 net tons.
Flux—14,907 net tons.

The Londonderry Co. purchase from outside sources a very large proportion of their ore and coke. It is therefore altogether fair to credit them with the hands employed in the production of this material, in all some 450 men. This gives a total at the present time of 800 employees connected directly and indirectly with the operations of the Londonderry Co.

THE NEW GLASGOW IRON, COAL & RAILWAY CO., FERRONA, PICTOU CO., N. S.

Ore Mines—Limonite and Hematite, yielding 60,000 to 75,000 tons per annum.

Coal Mines.

Limestone Quarries.

Railways—The property of the Company, about 13 miles in length, connecting the furnace with the mines.

One Blast Furnace—65 ft. high, bosh 25 ft. 6 in., hearth 9 ft. 6 in. Capacity 100 tons per day.

Battery of Coppe kilns.

Number of men employed—425.

Iron produced in 1893, for nine months campaign—22,500 net tons.

Ore—about 50,000 net tons.

Coke—30,000 net tons.

Flux—13,000 net tons.

The Company purchase all the coal required for the operations of the furnace. Last year they bought, washed, and consumed 90,000 tons of coal. It is only fair to credit the industry with the men steadily employed in the fuel department, viz, 150 men and 50 boys, giving a total average of 625 employees in connection with the Ferrona Works.

Allied with this Company, and as an important consumer of its forge iron, is the

NOVA SCOTIA STEEL & FORGE CO., LTD., OF NEW GLASGOW, N. S.

The following descriptions will show the great importance of this Steel Industry.

The Plant consists of:—

Two Siemens Melting Furnaces, 20 tons capacity each.

Three Gas Heating Furnaces,
Five Reverberatory Heating Furnaces.
Twenty-six" Reversing Cogging Mills with train of live rolls.
Heavy Vertical Hot Billet Shears with live rolls.
One 20" Plate Mill.
One 16" Bar Mill.
One 12" Bar Mill.
One 9" Guide Mill.
Ten Pairs Shears, 40 tons and smaller.
One 5-ton Steam Hamer, with 15-ton Hydraulic Crane.
Four smaller Steam Hammers.

Machine shop 175 ft. x 75 ft. with 30-ton travelling crane commanding whole shop, equipped with 24" Slotter, 6 Drills, (one a 9-ft. Radial, 5" Spindle) 9 Lathes, one of which will take in 50" over carriage, and 8" x 10" in the gap, will take 37 ft. between centres, small shapers. etc., etc. Power is supplied by some 50 steam and 10 hydraulic Cylinders. Entire works are lighted by Arc and Incandescent Light Plant.

Output 100 tons of Steel Ingots per day, all of which is worked up into bars, sheets, axles and other forgings.

Over 97,000 Axles of this Company's make were supplied to Canadian Railways.

This Company employed in 1893 an average of 425 men at the works, and expended in wages to this staff $185,471.00. Aside from this they should be credited with the labor necessary to mine and raise the average quantity of coal required per day, in all one hundred men, giving a total of 550 men connected with the Nova Scotia Steel & Forge Co. Ltd.

The Company consumed 36,000 tons of coal in 1893.

It may be mentioned also that they paid in 1893 for freights, inwards and outwards, $86,667.61.

THE PICTOU CHARCOAL IRON CO., LTD., BRIDGEVILLE, N. S.

Ore Mines—Brown Hematite and Limonite in the immediate vicinity of the furnace.

Wood Supply—The company controls 8,500 acres of hard wood lands, yielding principally yellow birch, beech and maple. This land is situated 15 miles from the furnace.

One Blast Furnace—55 ft. high, 11 ft. bosh, built of red brick. Capacity 5,000 tons charcoal iron per annum.

Charcoal Kilns—19 Beehive kilns, capacity 50 cords each.

This Company has barely commenced operation. So far only 700 tons of iron have been produced. Working full blast however it will give employment to 300 men in the woods, mines, and at the furnace.

JOHN McDOUGALL & CO., DRUMMONDVILLE, QUE.

Ores—Bog ores secured within a radius of 12 miles of Drummondville.

Charcoal Fuel—Soft wood, principally balsam and spruce, secured in practically the same district as the ores.

Two Furnace Stacks—Both built of stone, 35 ft. high. Capacity about 6 tons per day each; 200 men employed.

At present the whole of the output is used in the manufacture of car wheels at the Company's Works in Montreal. The campaign is therefore largely regulated by the requirements of the car wheel department.

THE CANADA IRON FURNACE CO., LTD., RADNOR FORGES, CHAMPLAIN, P.Q.

Ores—Bog and Lake. The Company control 100,000 acres of ore bearing lands in the districts of St. Maurice, Three Rivers, Vaudreuil, Joliette, St. Ambrose de Kildare, Point du Lac, Gentilly and Beaconcour, including the important deposits of lake ores at Lac-a-la-Tortue and Lac-au-Sable, which the Company hold in fee simple. Also magnetic iron mines at Sherbrooke, St. Jerome, and other points in the Province of Quebec.

Wood Supply—Free hold and royalty rights on hard wood lands extending throughout the country north of Radnor Forges.

The supply of wood is practically inexhaustible. The Company's location at Grandes Piles securing to them practically the "Key" of the St. Maurice River, and the control of most valuable hard wood lands on either bank of the river for seventy miles of the navigable waters of the St. Maurice. The wood is principally hard maple, birch and beech.

Charcoal Kilns—A battery of 11 kilns on the furnace property at Radnor Forges, capacity 55 cords each.

A battery of 14 kilns at Grandes Piles, capacity 55 cords each. Charcoal also made in pits in the Swedish manner.

Limestone Quarry—The Company owns what is perhaps the most important limestone quarry in the Three Rivers district. This lies within 50 yards of the furnace.

Railways—A railway line from Piles Branch, C. P. Ry., to the furnace. This together with switches is three miles in extent, all the property of the Company.

Car Wheel Shop—Located at Three Rivers.

Furnace—Iron shell, height 40 ft., bosh 9 ft. diameter. Crucible and bosh from mantle down is encased and protected with a Russel Wheel & Foundry Co. water jacket. The furnace is complete with all modern accessories. Hot blast stove, Drummond pattern. Steam and water power. New Weimer blowing engine, also complete auxiliary plant, blowing engines, steam and force pumps ready for use at any moment should the permanent plant become disabled.

Capacity—40 tons per day of high class Charcoal iron, specially adopted for the manufacture of chilled car wheels.

This iron stands an average breaking strain of 63,000 lbs. per square inch, the test being on standard bars 1″ x 12.

During 1893 the Company produced 7423 net tons of charcoal pig iron. They made all their own raw material, not alone for the production of the quantity of iron named, but also for sufficient stock to provide for a largely increased output during the present year, 1894.

The average number of men employed is 650, with about 400 horses.

During the winter months when the Company require to cut all the hard wood necessary for the year's production of charcoal, and when they take delivery of a great deal of the ore made during the summer months, they often find it necessary to employ a staff of upwards of 860 men, with about 550 horses.

Of the large staff of men, at least three-quarters are drawn from the ranks of the farmers and habitants, and the operations are carried on by them over a very large territory.

Politicians will do well to notice that each and every one of the Canadian blast furnaces are located in rural districts, and

that in a very peculiar degree the pig iron industry is one closely identified with the interests of the farmers.

The coke furnaces of Nova Scotia draw a large proportion of their employees at mines and furnaces from the farming class. In many instances the farmers take work in the mines, while other members of their families look after their agricultural interests. The charcoal iron furnace especially may well be classed as a farmers' industry. For example, in the case of the Canada Iron Furnace Co. already cited, out of a staff of 850 men employed at the present time, 700 at least of the employees are farmers or habitants, who work for the Company during the winter months and in their slack seasons, between seed time and harvest. These men find that the arduous work of clearing their land is no longer unprofitable, as it has been in the past, but that on the contrary they are now able to derive a very good living from the earliest days of settlement by supplying wood to the charcoal kilns.

Another ready source of employment is the raising of ore on portions of their own and neighboring lands, which would otherwise be wholly unproductive.

The successful re-establishment of the Charcoal Iron Industry at Radnor Forges has greatly improved the condition of the farmers of the historical Three Rivers district. They now find steady and profitable employment on their own land at all seasons, a steady market for their farm products, and ample work for their horses.

During the present season the Canada Iron Furance Co. are using in their camps and ore fields upward of 500 horses, 80 per cent. of which are the property of the farmers.

This close identity of interest between the farmer and the manufacturer is also characteristic of the work done at Drummondville, in the Province of Quebec, and will no doubt prove equally true with regard to the operations of the Pictou Charcoal Iron Co. at Bridgeville, N. S.

It will be largely in the interest of the farmers of Ontario and Quebec if the Charcoal Iron Industry is allowed to grow and prosper. What has been possible in the case of Sweden is equally possible for the Provinces of Ontario and Quebec, where the raw material and the market lie side by side. In 1890 Sweden had in blast 154 charcoal iron furnaces producing 456,102

metric tons, an industry of which that nation may well be proud. The utilization of the hard and soft woods of our forests, at present waste material, would be of incalculable benefit to the Provinces of Ontario and Quebec, and above all to the agriculturalists of these provinces.

Next to the farming class the Railways of Canada would perhaps be the greatest gainers by the establishment of an iron industry. In the case of the Government Railway, the Intercolonial, it is safe to say that the combined operations of the Londonderry Iron Co., the New Glasgow Iron, Coal & Railway Co., and the Nova Scotia Steel & Forge Co., furnish one-fifth of all the freight business of the railway in question.

The Piles Branch of the Canadian Pacific Ry., on which the works of the Canada Iron Furnace Co. are located, is perhaps the best paying piece of line possessed by that great Trans-Continental road, and this is very largely due to the fact that every pound of raw material inwards to the furnace and finished product outwards to the market contributes to the revenue of the Railway Co.

It is quite plain that any policy that would serve to cripple these iron industries *will be severely felt* by the Railways.

Perhaps the greatest difficulty that has stood in the way of the advancement of the Canadian Iron Industry up to the present time, has been the uncertainty of the tariff, and political cries of "Commercial Union," "Unrestricted Reciprocity," "Free Trade" and "Revenue Tariff" have served to frighten capitalists, so that Canadian iron masters have found it very difficult to obtain investors for the carrying forward of the work on a proper basis. When the difficulties are all considered it is remarkable that the Industry has reached even its present stage.

The United States at the present time presents an example of what uncertainty regarding tariff changes will do. During the past six months business has been completely demoralized in the iron trade of the Republic by the fear of a possible change in the duties. This in face of the fact that both parties in Congress are known to be more or less protectionist in theory and practice, the difference being only one of degree, whereas in Canada politicians are most extreme in their views, and the battle against protection to native industries has been waged in and

out of Parliment during all the term that the so-called National Policy has been in existence.

With such a neuclus as the existing establishments afford, with unlimited supplies of raw material, and possessing the best of all markets—a home market—the Canadian Iron Industry cannot fail to expand rapidly and safely, probably as in the case of the United States much more rapidly than the population, if only the Government of Canada will establish confidence in the minds of capitalists by, in some manner, giving a degree of permanency to the present protective tariff. Minor details will from time to time require adjustment, but the broad principal of protection to an industry for which Nature has so eminently fitted the Dominion, must be endorsed by both Government and opposition, giving a fair period of time in which to secure a full development of the industry, so that it may meet, on something like equal terms, the opposition of its powerful competitors in the United States and Great Britain. Without this the industry will be restricted, and in time of depression such as at present, the iron masters of the United States will simply unload their bankrupt stocks into Canada, with the end that a healthy Canadian industry will be an utter impossibility.

It is a notable fact that during the past four years the increased outputs of the Canadian furnace has led to a decreased cost of production per ton of iron, and Canadian makers have now forced foreign agents to lower their prices fully $3.00 per ton from prices asked four years ago. A well maintained tariff for some years to come will have exactly the same tendency as it had in the United States, viz., to strengthen and expand the native industry to the point where Canadians can control the entire trade of the country, and yet sell to the consumer at as low a price as any foreign competitor can do in his own country.

LOCATION.

The question of a proper location of Coke and Charcoal furnaces will be settled by the natural fitness of each Province. Nova Scotia, possessing as she does a great wealth of mineral fuel, must continue for some time to come to produce the coke

iron required by the country. It may be urged that she is far removed from her best market, viz. Ontario. However, Nova Scotia is in as good a position in this respect, and ought to be in regard to freight rates, as her present greatest competitors, viz., the furnaces of the Southern United States. Within the past two years Nova Scotia has made great progress in the erection of modern plants and improved appliances. She must continue on this course, for the time is past when iron can be successfully produced without improved appliances both in construction and modern methods of operation. The blast furnace must meet the consumer's wants, in quality of iron and technical knowledge and administrative ability must be joined together in Nova Scotia just as in the United States to secure the increased output, and high quality of iron which the times demand. Quebec and Ontario will afford a splendid field for the development of the Charcoal iron industry, and this department will become more and more important as the forests of the neighboring Republic and Sweden are depleted.

It is hardly feasible under existing circumstances to successfully establish coke furnaces in either Ontario or Quebec, inasmuch as these Provinces would have to depend upon importing their supply of fuel from the United States. Such an industry would be of little value to the Provinces or the Dominion inasmuch as by far the largest proportion of labor required in the manufacture of iron is that connected with the mines, both coal and iron. Certainly the Government would not be warranted in granting a bounty for the establishment of an industry contributing as largely as this would to the labor of our most important competitor, the United States.

There is a reasonable hope that in due time Nova Scotian coal will be profitably coked at Montreal, and other centres of population, through the utilization of by-products. When that time comes, Ontario and Quebec will be in a position to operate blast furnaces economically with mineral fuel, the product of Nova Scotian mines, thereby adding another link to strengthen the confederation of the Canadian Provinces.

For the immediate future the charcoal iron industry offers the best and surest field of operation and investment to the Provinces of Ontario and Quebec.

A full and unbiassed investigation into all the facts concerning

the successful establishment of the iron industry in other countries, and of the circumstances attending the work already done in Canada, leads to the following conclusions:

First—That the Canadian iron industry has greater and more just claims to the good will and support of the Government and people of Canada than perhaps any other of the great industries of the country. In tobacco, sugar and cotton, splendid progress has been made, yet these industries, whilst of unquestionable benefit to the country, all contribute more or less to the labor of foreign countries, by using raw materials of foreign growth, for which nature has not fitted Canada. The iron industry is altogether different, being purely Canadian from raw material to finished product. Nature has richly endowed Canada with everything that goes to make success in this special line of enterprise. It rests with the Government and the people of the Dominion to foster the industry to a perfect development.

Second—The Dominion Parliament must immediately adopt a course that will give confidence to investors, by demonstrating that the protective tariff and bounty will be well maintained for some time to come. The Government must rectify judiciously any errors that may have arisen, and must seek at least approximately *to grant a uniform protection to labor, in whatever branch of the industry it may be employed*, be it at the mines, furnace, rolling mills, iron foundry or machine shop.

Third—The Provincial Governments must take steps immediately to encourage by every reasonable concession the development of the iron industries now within their respective borders.

In Quebec and Ontario every facility should be granted by the Provincial Governments in the way of privileges for the clearing of hard and soft woods from Crown lands. This course will not only strengthen and build up the charcoal iron industry, but will bring about a rapid settlement of Government lands.

Hitherto settlers have avoided the forest lands of the East, in favor of the more easily cultivated prairies of the West. Establish the Charcoal Iron Industry in Quebec and Ontario, and the settlers will find a sure and profitable return for labor expended in clearing the wood, an inducement that will make

the bushlands of these Provinces more attractive than the prairies of the West.

The section of the different provincial mining laws, providing for a proper expenditure in the development of mining locations within a given time, should be strictly enforced, and if possible the obligations made even more stringent than at present, so as to ensure a fair amount of work being done promptly, and prevent as much as possible the "locking up" of valuable mines by speculators.

Where the owners of locations are too poor to carry on the work of development in a proper manner, then the Provincial Government should do so by some equitable arrangement with the owner. For this purpose the Provincial Legislatures should vote in each year's supplies a reasonable sum of money. This would serve to bring about a business-like development of some very valuable mines that now lie dormant, and must in time bring a very profitable return to the Government by the settlement of Crown lands.

Further, it would tend to prove to capitalists that the ore supplies are all that they are claimed to be, and ample for all requirements.

The Provincial Governments require to deal with the whole question in a business-like manner, strictly enforcing laws that will tend to an early development, but at the same time they must be heartily in accord with the Dominion Government in granting every legitimate encouragement and facility that will tend to build up so valuable an industry.

Fourth—Canadian bankers, capitalists, and men of affairs generally will do well to give the native industry more attention in the future than they have in the past. An industry that is peculiarly Canadian in every branch, drawing all its wealth from Canadian soil, is surely worthy of their legitimate support. The fact that the earlier iron industries of this conntry failed to succeed under the most adverse circumstances is no reason why, under existing conditions, undeniably more favorable, the industry cannot be made a thorough success, not alone affording a great field for the safe investment of capital, but indirectly benefiting other existing Canadian industries and interests, aiding toward increased population and national wealth.

Let the Canadian Government and people go steadily onward, and by every energy and sympathy build up great national industries and interests, neither doubting themselves nor their resources, but rather cultivating in every department of trade and commerce, and in the hearts of the people, that national pride in national products so characteristic of Englishmen and Americans. Following such a course Canada must soon develop not only in her Iron Industry, but in every department of national life.